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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/838,084	04/18/2001	Guo-Qiang Lo	IDT-1651	9576

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EXAMINER

FOONG, SUK SAN

ART UNIT PAPER NUMBER

2823

DATE MAILED: 10/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/838,084

Applicant(s)

LO ET AL.

Examiner

Suk-San Foong

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 5-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 11-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- ☐ Interview Summary (PTO-413) Paper No(s) ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-4 and 11-19 in Paper No. 4 is acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 13 recites the limitation "the mask layer" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b)

only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nariman et al. ('283) in combination with Ghandhi.

Nariman et al. disclose a process for forming isolation structure for semiconductor device which includes forming pad oxide layer 44 over semiconductor substrate 42 (Col. 4, lines 45-47, and Fig. 5), then forming insulating layer 46 comprised of a material or a combination of material such as silicon oxynitride and silicon nitride over substrate 42 (Col. 4, lines 61-67, and Col. 5, lines 4-11), then forming a masking layer over insulating layer 46 (Col. 5, lines 51-52), subsequently etching through layers 44, 46 and the substrate 42 to form trench 48 (Col. 5, lines 51-57, and Fig. 6), then removing the mask layer (Col. 6, lines 7-8), then performing thermal oxidation in the presence of oxygen to form oxide liner layer 58 and densifying layer insulating layer 46 (Col. 6, lines 13-16, and Fig. 7) where a separate heating step may be used for densifying insulating layer 46 (Col. 6, lines 36-37), then depositing insulating material 66 over liner oxide layer 58 (Col. 6, lines 41-44, and Fig. 80), and then performing chemical mechanical polishing of insulating material 66 thereby removing portions of insulating layer 46 (Col. 6, lines 50-51, and Fig. 8).

Nariman does not disclose the step recited in claim 1, lines 6-7.

Ghandhi teaches cleaning surface of semiconductor wafers after each processing step in a fabrication using wet cleaning process (p. 641).

Art Unit: 2823

It would have been within the scope to one ordinary skill in the art to combine both teachings it would enable wet cleaning after heat treating insulating layer 46 of Nariman to be performed and obtain further advantage of reducing contaminants and avoiding operator error.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nariman et al. ('283) as applied to claims 1-3 above.

The combination does not disclose the step as recited in claim 4.

One of ordinary skill in the art would have been motivated to arrive at selected duration and temperature for use in the process of the combination through routine experimentation depending on the desired device dimension and device characteristics because time and temperature are recognized to be a result effective variable.

7. Claims 11, 12, 13, 14, 15, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nariman et al. ('283) in combination with Ghandhi as applied to claims 1-3 above, and further in view of Song et al. ('823) and Wolf.

Nariman et al. do not teach the steps recited in claim 11.

Song et al. teach a method of forming trench isolation of a semiconductor device which includes forming pad oxide layer 114 over substrate 110 (Col. 4, lines 31-34 and lines 38-40, and Fig. 4), then forming silicon nitride layer 120 as hard mask layer over pad oxide layer 114 (Col. 4, lines 40-43), subsequently forming silicon oxynitride layer 122 as an anti-reflective layer over silicon nitride layer 120 (Col. 4, lines 48-50), then patterning and developing photoresist layer 150 over silicon oxynitride layer 122 by photolithography (Col. 4, lines 34-36), then etching through pad oxide layer 114, silicon nitride layer 120 and silicon oxynitride layer 122 (Col. 4,

Art Unit: 2823

lines 51-56, and Fig. 5), subsequently etching through substrate 110 thereby forming trench 123 (Col. 4, lines 57-62, and Fig. 6), then forming liner oxide layer 125 (Col. 5, lines 37-45), and subsequently depositing insulating layer 130 in trench 123 (Col. 5, lines 50-54).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable formation of trench 48 of Nariman et al. to be performed.

The combination process does not disclose the steps recited in claim 12.

Wolf teaches patterning photoresist layer by exposing the layer through a reticle in photolithography process (p. 407 and 476)

It would have been within the scope to one ordinary skill in the art to combine the teachings of Wolf with the combination process because it would enable formation of photoresist layer 120 of the combination to be performed.

8. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nariman et al. ('283) in combination with Ghandhi as applied to claims 1-3 above, and further in view of Applicant's Admitted Prior Art (AAPA).

The combination process does not disclose the step in claim 18.

The combination process does not disclose the step in claim 19.

AAPA discloses a wet cleaning process in the presence of silicon oxynitride layer by using hydrogen fluoride (HF) and buffered oxide etch (BOE) (Instant p. 2-3).

It would have been within the scope to one ordinary skill in the art to combine the teachings of AAPA with the combination because it would enable wet clean step of the combination to be performed.

Art Unit: 2823


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



October 20, 2002



George Pourson
Primary Examiner
Art Unit 2823